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When organic products are tasty: Taste inferences from an Organic = Healthy Association

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ABSTRACT

Previous research has consistently demonstrated that organic food is typically seen as healthier. The aim of the present study is to investigate how these health inferences influence taste perceptions of organic food. In Study 1, we show that a neutral food product with an organic label is perceived as more healthy than the same product without such a label. This higher level of perceived healthiness is paired with an improved perceived taste. In Study 2 and 3, we obtain evidence in Dutch and US samples that an organic label increases perceived taste and attractiveness of healthy (but not unhealthy) food. Whereas previous studies have shown general health halo effects of organic labels, this perspective cannot explain the specific pattern of our results, which speaks towards an 'organic = healthy = tasty' intuition.

1. Introduction

Our current food consumption habits have a tremendous detrimental effect on the natural environment. Globally, food production causes 20 to 30 percent of humanity's total ecological footprint (Garnett, 2013; Ivanova et al., 2016; for a review, see Tukker & Jansen, 2006). One way to decrease this impact is a shift from conventional food to organic food products. Organic products are produced in a sustainable environmental manner, aiming for a minimization in production used energy, a preservation of natural resources and protection of biodiversity (Niggli, Fließbach, Hepperly, & Scialabba, 2009; for a review, see Reisch, Eberle, & Lorek, 2013; Shepherd et al., 2003). In recent years, consumer acceptance of organic products has grown substantially reaching total sales from 15 billion US dollars in 2001 to almost 90 billion US dollars in 2016. In leading organic markets, USA and Germany, share of organic products is now 5 percent, while in countries like Austria, Denmark, and Sweden it has reached close to 10 percent (Willer & Lernoud, 2018).

Next to the environmental benefits of consuming organic foods, an additional driver of this growth is the perception that organic foods are healthier than their (conventional) counterparts. Although the link is not unequivocally supported by food and nutrition science (for a review, see Mie et al., 2017), there is considerable research showing that consumers perceive organic products to be more healthy than non-organic counterparts (Harris Interactive, 2007; for a review, see Hughner,

McDonagh, Prothero, Shultz, & Stanton, 2007; Yiridoe, Bonti-Ankomah, & Martin, 2005).

Although the perceived healthiness may generally be regarded as having a positive impact on demand for organic food products, there may also be a downside, as some studies provide evidence for a negative association between taste and health (Raghunathan, Naylor, & Hoyer, 2006). Other research has reported a positive association between healthiness and taste (Haasova & Florack, 2019; Jo & Lusk, 2018; Werle, Trendel, & Ardito, 2013). Unfortunately, there is no research studying the network of associations between "organic", "tasty" and "healthy", although prior research has studied consumers' inferences and lay beliefs regarding the healthiness and taste of organic foods.

In the present paper we therefore investigate how taste inferences may arise from the association between organic food and healthiness. In particular, we examine the notion that organic labels increase inferred taste in healthy food products, but less so in unhealthy food products. After all, it is unlikely that the simple addition of an organic label shifts the perception of the nature of unhealthy food products if organic labels are (mis)interpreted as health labels. We thus propose that if organic products are seen as more tasty because of their presumed healthiness, this effect is unlikely to generalize to taste inferences for all types of food products. In this way, the paper contributes to the literature on the perception of organic foods, by examining the associations between organic foods, and perceptions of healthiness and taste, and by proposing that the association between organic and "tasty" exists for

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healthy foods, but not for unhealthy foods. Together with the process evidence, this finding provides insights into how taste and health associations of organic foods are related to each other. These insights have implications for marketing and policy with regard to organic foods.

1.1. Organic = Health Association

Organic food carries a strong connotation of healthiness (Harris Interactive, 2007; Schuldt & Hannahan, 2013; for a review, see Hughner et al., 2007), although the scientific evidence for these benefits seems limited (for a review, see Dangour et al., 2010; Mie et al., 2017; Smith-Spangler et al., 2012). Still, the association between an organic food production and healthiness has been observed for both healthy and unhealthy products (Lee, Shimizu, Kniffin, & Wansink, 2013; Schuldt & Schwarz, 2010) and even holds when consumers are presented with contrary evidence (Olson, 2017).

Organic food labels thus seem to lead to so-called “health halo effects”, caused by the generalization of the positivity of organic product healthiness perceptions to consumer evaluations of other (positive) product dimensions (Schuldt & Schwarz, 2010). Indeed, there is empirical evidence that consumers assign various health-related benefits to organic products, such as food safety (Ellison, Duff, Wang, & White, 2016; Hoefkens, Verbeke, Aertsens, Mondelaers, & Van Camp, 2009), lower caloric value (Schuldt & Schwarz, 2010), better nutritional value (Lee et al., 2013; Sörqvist et al., 2015), and even a positive impact on mental performance (Sörqvist et al., 2015).

Whereas taste is one of the primary motivators consumers explicitly identify for buying organic foods (for a review, see Hughner et al., 2007) empirical evidence for the association between organic labeled foods and taste remains inconclusive. For instance, whereas some studies show that organic labeled products are perceived as tastier than their conventional counterparts (Annett, Muralidharan, Boxall, Cash, & Wismer, 2008; Sörqvist et al., 2015, 2013) other studies show exactly the opposite (Rousseau, 2015; Schuldt & Hannahan, 2013), do not observe any relationship (Poelman, Mojet, Lyon, & Sefa-Dedeh, 2008; Tobin, Moane, & Larkin, 2013; Toschi et al., 2012) or obtained seemingly inconsistent and inconclusive results (Ellison et al., 2016; Lee et al., 2013). Importantly, these studies often focused on very specific products (e.g. bread, bananas, chocolate, coffee, yogurt, cookies), so that idiosyncratic properties of the specific products or product categories may be responsible for differences between the studies (i.e., organic bread may be perceived as tastier than conventional bread, but this may not be true for organic chocolate or cookies).

Given this mixed evidence on the relation between organic labeling and product taste inferences we aim to examine why - and in which instances - organic food is perceived as more tasty (and thus more favorable).

1.2. Influence of Organic = Health Association on taste inferences

Several studies have examined the link between perceived healthiness and perceived taste, whereas somewhat older work points to a negative association (Raghunathan et al., 2006), more recent research provides convincing evidence for a positive relation between foods' perceived healthiness and taste (Haasova & Florack, 2019; Jo & Lusk, 2018; Werle et al., 2013). So far, this link has not been examined in the context of organic food (labels). We suggest that a positive association between taste and health in the context of organic foods may drive the association between organic food and taste ratings. More specifically, we posit that organic labels positively influence taste evaluations because of the inferred healthiness of such labels.

To test this proposition, it is possible to apply two different types of experimental design. A first meaningful approach is to directly test if organic labels influence taste perceptions and, if this effect is mediated by inferred health perceptions. A second approach is to provide causal

evidence for our reasoning by applying a moderation-of-process design (Spencer, Zanna, & Fong, 2005) in which the process is experimentally manipulated (rather than measured). If our reasoning is correct that the effect of organic labels on perceived tastiness operates through increased healthiness, then it should be neutralized for products that are unlikely to benefit from a health premium, i.e. unhealthy food. Accordingly, previous research has shown that health labels increase taste perceptions for healthy food and for food without strong health connotations, but not so for unhealthy food items (Jo & Lusk, 2018). One explanation for this finding is that the fit between product healthiness image and health related information plays an important role in consumer evaluations. In support of this argument, studies have found that health claims are more effective when used on healthy compared to unhealthy food products (Adams & Geuens, 2007; Choi & Springston, 2014; Choi, Paek, & Whitehill King, 2012; Van Kleef, van Trijp, & Luning, 2005).

If organic labels influence taste inferences through perceived healthiness, we expect them to exert the same effect as health labels on respectively healthy vs. unhealthy food. Therefore, in our current set of studies we will adopt both these types of design to provide evidence for our main proposition.

Finally, we would like to generalize the presumed impact of organic labels on taste inferences to the general appeal of food products. While tastiness and attractiveness are very closely connected in food product evaluations (cf. Raghunathan et al., 2006), taste is about the sensory qualities of the product whereas attractiveness is about the general appeal of the product (Lähteenmäki et al., 2010). If our reasoning holds, we should not only be able to observe the effect of organic labels on taste inferences, but also on more general attractiveness ratings.

Summarized, we predict the following:

Hypothesis 1: For food without strong health connotations, organic labels positively influence taste evaluations and this effect is mediated by the inferred healthiness of such labels.

Hypothesis 2: Organic labels positively influence taste evaluations of healthy, but not unhealthy food.

Hypothesis 3: Organic labels positively influence attractiveness of healthy, but not unhealthy food.

We provide empirical evidence for these hypotheses in three experimental studies. Study 1 demonstrates that merely labeling a neutral food product (white rice) as organic increases its perceived healthiness, which in turn results in increased taste evaluations. In Study 2, we obtain experimental evidence in a controlled lab setting (and with a much wider range of food products) that an organic label increases perceived taste of products in healthy food categories, but not in unhealthy food categories. In Study 3, we conceptually replicate our second study and generalize our findings to (a) an online US panel and (b) attractiveness ratings, thereby confirming that organic labels increase the general appeal of healthy food, but not of unhealthy food.

2. Study 1: Organic label increases perceived healthiness and taste

2.1. Method

In the first experiment we test our hypothesis that labeling a product as organic influences its perceived taste because of its inferred healthiness. Two hundred and eighty-two adult participants (M age = 38, 158 females, 124 males) recruited from Amazon's Mechanical Turk completed the study and passed the attention check¹ and were

¹ To ensure collected data quality, an attention check was included as an additional item (see Curran, 2016) at the end of the health-consciousness scale (“Please click ‘Strongly disagree’”). This item is to check whether you read all statements”; 1 = strongly disagree to 5 = strongly agree). In total 6

randomly assigned to either an organic or non-organic condition. Participants first received an imagination scenario in which they imagined going to a local grocery store because they were preparing a dish for a dinner party and needed to buy rice. After this introduction, they were asked to describe how their guests would like the taste of the dish (in at least 15 words). Depending on condition, the store and the rice ingredients were described as either being organic or not. Next, all participants received the same picture of a bowl with white rice (with either an organic label present or not; see Appendix A for the image of both conditions). A pretest ($N = 101$) indicated that white rice scored neutral on perceived healthiness ($M = 3.14$; $SD = 1.03$ on a 5-point scale; see Appendix B). Participants then evaluated on a 5-point Likert scale perceived taste ("How tasty would (organic) white rice appear to you in the local (organic) grocery store?"; 1 = very untasty to 5 = very tasty) and thereafter perceived healthiness ("How healthy would (organic) white rice appear to you in the local (organic) grocery store?"; 1 = very unhealthy to 5 = very healthy).

Thereafter, participants completed the 6-item health consciousness scale from Michaelidou and Hassan (2008) and answered 3 items to measure their subjective knowledge on organic products, adapted from Pieniak, Aertsens, and Verbeke (2010) (both on a 5-point Likert scale, for the items see Appendix C). Finally, participants indicated to what extent they felt hungry (1 = not hungry at all to 5 = very hungry), answered demographic questions (age, gender) and indicated their level of English proficiency. Before analyzing the results, we averaged the 6 health consciousness items ($\alpha = 0.85$) and the 3 items measuring subjective knowledge on organic products ($\alpha = 0.90$) to obtain overall measures for these two constructs.

2.2. Results and discussion

2.2.1. Healthiness and taste evaluations

As predicted, the results from an independent-samples *t*-test revealed a positive significant effect of organic labeling on perceived healthiness and taste evaluations of a neutral food product. The white rice that was labeled as "organic" was perceived as tastier ($M_{\text{organic}} = 3.64$, $SD = 0.89$, versus $M_{\text{non-organic}} = 3.19$, $SD = 0.94$, $t = 4.05$, $p < .000$) and healthier ($M_{\text{organic}} = 3.87$, $SD = 0.86$, versus $M_{\text{non-organic}} = 3.14$, $SD = 0.97$, $t = 6.80$, $p < .000$) than non-organic.

2.2.2. Mediation

We then tested the predicted pathway that an increase in perceived product healthiness leads to an increase in the perceived taste for an organic neutral product (white rice). To do so, we dummy coded the two conditions as 0 = non-organic and 1 = organic as a predictor variable, healthiness as a mediator, and taste as a dependent variable and ran a bootstrap mediation analysis using the PROCESS macro (Hayes, 2017, model 4). The bootstrap analysis revealed, as expected, that the main indirect effect was positive and significant ($b = 0.20$), with a 95% confidence interval excluding zero [0.101, 0.321] (see Fig. 1). Adding the measured covariates (health consciousness, subjective knowledge on organic products, level of hunger and gender) to the analyses did not substantially alter the results (the main indirect effect remains significant ($b = 0.16$), with a 95% confidence interval excluding zero [0.067, 0.265]).

2.2.3. Discussion

The results were consistent with our prediction that the organic label positively affects not only perceived healthiness but also perceived taste of a food product without strong health connotations (white rice). In addition, we demonstrate that perceived healthiness

drives this increase in perceived taste for organic food products. Whereas our findings support our main proposition, we would like to point out that the observation of statistical mediation is still not sufficient to determine causality. Therefore, in the following studies we decided to apply a moderation-of-process design (Spencer et al., 2005) to test when the effect should hold (or not) given that it is driven by perceived healthiness, like Study 1 suggests.

3. Study 2 and 3: Organic label increases perceived taste and attractiveness of healthy organic products but not unhealthy organic products

In line with our first hypothesis we show in Study 1 that organic white rice is perceived as more healthy than conventional white rice, resulting in increased taste evaluations. If our reasoning is correct that the effect of organic labels on perceived tastiness operate through increased healthiness, then the effect should be neutralized for products that do not benefit from a health premium, i.e. unhealthy food (cf. Jo & Lusk, 2018). Therefore, Study 2 aims to test our second hypothesis that organic labels increase perceived taste evaluations of healthy products but not of unhealthy products. This study widens the scope of this paper to a much wider range of food products (10 in total), and is carried out in a controlled lab setting.

Study 3 again uses Amazon's Mechanical Turk sample with exactly the same procedure as in Study 2, except that our dependent measure is perceived attractiveness to test our third hypothesis that organic labels increase perceived attractiveness of healthy products but not of unhealthy products. By doing so, this study does not only aim to replicate Study 2 results, but also to further generalize our results to people in another society (US) and more general product evaluations, i.e. the general appeal of the food.

3.1. Method

3.1.1. Method Study 2

One hundred seventy-four (M age = 21, 62 females, 112 males) students from a large Dutch university completed the study in exchange for course credit and were randomly assigned to either an organic or non-organic condition. We adopted a 2 (between: organic vs. non-organic) \times 2 (within: healthy vs. unhealthy food products) mixed design. Participants first received an imagination scenario in which they received a gift certificate from a local grocery store, and therefore went shopping there. They had a grocery list with both healthy foods, as well as some unhealthy foods. After this introduction, they were asked to describe how they imagined a shopping experience at the local grocery store². Depending on condition, the store and the food items were described as either being organic or not. Next, all participants received pictures of ten randomly presented food products (five healthy and five unhealthy) and evaluated these on 5-point Likert scale on perceived taste ("How tasty do you think the following (organic) food items would appear to you in the store?"; 1 = very untasty to 5 = very tasty). These pictures either included an organic label or not (depending on the condition). Based on the pretest ($N = 101$) results we selected five most healthy products (apple $M = 4.60$; strawberries $M = 4.51$; almonds $M = 4.29$; fresh orange juice $M = 4.10$; whole grain bread $M = 4.04$) and five most unhealthy products (potato chips $M = 1.70$; ice cream $M = 1.67$; chocolate cookies $M = 1.54$; sugary cereal $M = 1.49$; sugar candies $M = 1.32$) that scored closely on the familiarity dimension (see Appendix B). Before analyzing the results, we averaged the 5 healthy product items ($\alpha = 0.66$) and 5 unhealthy product items ($\alpha = 0.69$) to obtain single measures for healthy and unhealthy product constructs. Given the relatively low Cronbach alpha's, we did an additional check

(footnote continued)

participants did not pass the attention check (did not click 'strongly disagree') and were a priori excluded from any analysis.

² 1 participant did not write anything in the imagination scenario and was therefore a priori excluded from any statistical analysis.

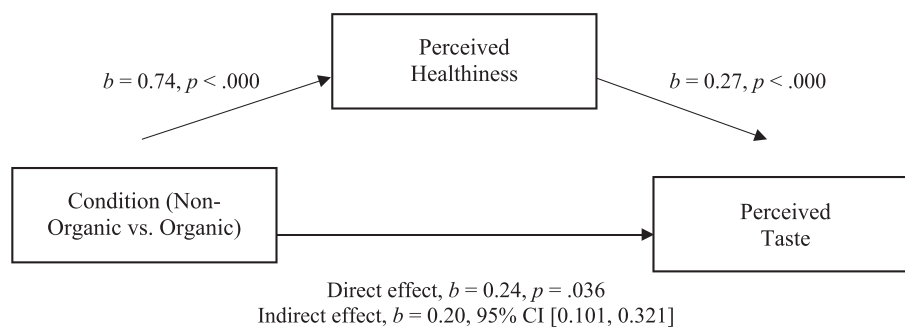


Fig. 1. Perceived healthiness of the organic label mediates the effect on perceived taste in Study 1.

for the reliability of our categorization into a 'healthy' vs 'unhealthy' categorization and ran a principal component analysis. This analysis retained 2 factors with an eigenvalue larger than 1. The (varimax rotated) factors showed a first factor on which the unhealthy food items loaded (all unhealthy food products had factor loadings between 0.54 and 0.74; all healthy food products had factor loadings lower than 0.34), and a second factor on which the healthy food items loaded (all healthy food products had factor loadings between 0.51 and 0.78; all unhealthy food products had factor loadings lower than 0.27). Interestingly, the effect of the organic label (as documented below) was strongest for products that were most representative for the healthy food category (almonds and apples; see Appendix E and F).

3.1.2. Method Study 3

Two hundred and thirty-five participants (M age = 39, 119 females, 116 males) recruited from Amazon's Mechanical Turk completed the study and passed the attention check³ and were randomly assigned to either an organic or non-organic condition. We applied exactly the same procedure as in Study 2 but now we asked participants to evaluate perceived attractiveness on 5-point Likert scale ("How attractive do you think the following (organic) food items would appear to you in the store?"; 1 = very unattractive to 5 = very attractive). Before analyzing the results, we averaged the 5 healthy product items ($\alpha = 0.65$) and 5 unhealthy product items ($\alpha = 0.74$) to obtain single measures for healthy and unhealthy product constructs.

At the end of both studies participants completed the 6-item health consciousness scale from Michaelidou and Hassan (2008) and answered 3 items to measure their subjective knowledge on organic products, adapted from Pieniak et al. (2010) (both on a 5-point Likert scale, for the items see Appendix C). Then participants were asked to describe how they understand the term 'organic food'. Finally, participants indicated to what extent they felt hungry (1 = not hungry at all to 5 = very hungry), answered demographic questions (age, gender, nationality) and indicated their level of English proficiency. Before analyzing the results, we averaged the 6 health consciousness items (Study 2: $\alpha = 0.82$; Study 3: $\alpha = 0.86$) and also averaged the 3 subjective knowledge on organic products items (Study 2: $\alpha = 0.87$ Study 3: $\alpha = 0.92$) to obtain single measures for these specific constructs.

At the end of Study 3 all participants also completed the 15-item New Environmental Paradigm scale (NEP; Dunlap, Van Liere, Mertig, & Jones, 2000), a common measure of pro-environmentalism (for the scale items see Appendix C). Before analyzing the results, we averaged the 15 items to obtain a single measure for the construct ($\alpha = 0.91$).

³ To ensure collected data quality, a similar attention check like in Study 1 was included as an additional item (see Curran, 2016) at the end of the NEP scale ("Please click 'Strongly disagree'. This item is to check whether you read all statements"; 1 = strongly disagree to 5 = strongly agree). In total 6 participants did not pass the attention check (did not click 'strongly disagree') and were a priori excluded from any analysis.

3.2. Results and discussion

3.2.1. Results and discussion Study 2

A mixed-design analysis of variance assessed the effect of organic labeling on perceived taste of healthy and unhealthy food, which were included as repeated measures. Results indicated a main effect of food product healthiness $F(1,172) = 86.64, p < .000$, partial $\eta^2 = 0.335$ and a significant two-way interaction between labeling and food product healthiness $F(1,172) = 4.97, p = .027$, partial $\eta^2 = 0.028$ (see Table 1⁴). Further analyses revealed that there was an effect of organic labeling for healthy $F(1,172) = 5.99, p = .015$, partial $\eta^2 = 0.034$, but not for unhealthy food products $F(1,172) = 0.21, p = .646$, partial $\eta^2 = 0.001$. Adding the measured covariates (health consciousness, subjective knowledge on organic products, level of hungeriness and gender) to the analyses did not substantially alter the results, although they become a bit weaker (the key two-way interaction effect is marginal $F(1,168) = 3.67, p = .057$, partial $\eta^2 = 0.021$, just like the effect of organic labeling for healthy food products $F(1,168) = 3.10, p = .08$, partial $\eta^2 = 0.018$).

In support of hypothesis 2, we find that healthy food, but not unhealthy food is perceived to be tastier when it has an organic label. By blocking the effect of organic labels on taste perceptions for unhealthy food we provide causal evidence for our key proposition that the effect of organic labels on taste evaluations is explained by perceived health.

3.2.2. Results and discussion Study 3

A mixed-design of analysis of variance assessed the effect of organic labeling on perceived attractiveness of healthy and unhealthy food, which were included as repeated measures. Results indicated a main effect of product healthiness $F(1,233) = 141.85, p < .000$, partial $\eta^2 = 0.378$ and a significant two-way interaction between labeling and food product healthiness $F(1,233) = 5.38, p = .021$, partial $\eta^2 = 0.023$ (see Table 2⁵). Further analyses revealed that there was an effect of organic labeling for healthy $F(1,233) = 4.01, p = .046$, partial $\eta^2 = 0.017$, but not unhealthy food products $F(1,233) = 1.28, p = .26$ partial $\eta^2 = 0.005$. Adding the measured covariates (health consciousness, subjective knowledge on organic products, level of hungeriness, NEP and gender) to the analyses did not substantially alter the results (the key two-way interaction effect remains significant $F(1,228) = 4.25, p = .04$, partial $\eta^2 = 0.018$, just like the effect of organic labeling for healthy food products $F(1,229) = 5.10, p = .025$, partial $\eta^2 = 0.022$).

These findings replicate the effect discovered in the Study 2 and provide support for our hypotheses, using a different sample (US Amazon's Mechanical Turk participants versus Dutch students) and a different but closely related dependent variable - attractiveness rather than perceived taste. As such, we provide evidence that organic labels do not only influence perceived taste but also overall appeal of healthy

⁴ Effects for specific food products can be found in Appendix E.

⁵ Effects for specific food products can be found in Appendix F.

Table 1

Perceived taste evaluation for healthy and unhealthy food products for each condition (non-organic vs organic) in Study 2.

	Non-Organic		Organic		F value (p)
	M	SD	M	SD	
Healthy	3.74	0.53	3.96	0.63	5.99 (0.015)*
Unhealthy	3.32	0.62	3.28	0.70	0.21 (0.646)

* Significant at $p < .05$ (ANOVA, two-sided test).

Table 2

Perceived Attractiveness Evaluations for Healthy and Unhealthy Food Products for Each Condition (Non-organic vs Organic) in Study 3.

	Non-Organic		Organic		F value (p)
	M	SD	M	SD	
Healthy	3.71	0.62	3.89	0.76	4.01 (0.046)*
Unhealthy	3.08	0.85	2.96	0.83	1.28 (0.26)

*Significant at $p < .05$ (ANOVA, two-sided test).

food products.

4. General discussion and conclusions

Previous research consistently demonstrates that organic food is perceived as healthier. Although perceived healthiness is very important in shaping consumer food choices, research also shows that consumers are not willing to sacrifice food taste for perceived health benefits (Carrillo, Varela, & Fiszman, 2012; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). For those who are interested in promoting organic food consumption, it is unfortunate that previous research has shown mixed results on the perceived taste of foods that are labeled as organic, with some studies finding positive associations, and others findings negative or no associations.

Prior research on the perception of taste and healthiness of organic foods has studied these factors in isolation. In the present research, we examine their interrelations, and propose that the perceived health associations may have positive consequences for organic product taste inferences. We further argue that this effect is especially pronounced for organically labeled products in categories that are perceived as healthy. These hypotheses were examined in three studies. In Study 1 we show that merely adding an organic label on a neutral food product increases both its perceived healthiness and taste evaluations. Moreover, we demonstrate that the positive effect on taste evaluations is mediated by perceived product healthiness of organic products. In Study 2 and 3, we demonstrate that an organic label especially increases perceived taste and attractiveness evaluations of healthy but not unhealthy food products.

This article makes several contributions to the literature. First, our work is the first to identify that organic products are evaluated as higher in perceived taste due to their increased healthiness. Second, we provide evidence that organic labeling increases taste perceptions of healthy but not unhealthy food. Finally, our findings add to the literature on the relation between healthiness and taste, thereby suggesting that a simple health label may increase perceived taste, in line with recent findings (Jo & Lusk, 2018; Werle et al., 2013) but in contrast to the commonly accepted unhealthy = tasty intuition (Raghunathan et al., 2006).

Our results are consistent with trends in secondary data on markets for organic foods, which suggest that the organic label is not equally beneficial for all product categories. While an organic food market has

been growing steadily over the last two decades from less than 15 billion US dollars in 2001 to almost 90 billion US dollars in 2016, there is significant variation in consumer demand for specific organic product categories: whereas organic fruit, vegetables, dairy and eggs have the highest market shares and constitute from 10 to 25 percent of their category sales, organic meat and bakery generally have low market shares (Willer & Lernoud, 2018). This observation is in line with our pattern of results, that shows that healthy organic products are seen as more tasty than their non-organic counterparts, but that this effect does not necessarily hold for unhealthy food products. As a consequence, consumers may be less likely to pay a price premium for unhealthy organic products if they do not infer higher product attractiveness.

At first sight, our findings may be inconsistent with the observation that organic labels may sometimes increase unhealthy food consumption (Schuldt & Schwarz, 2010). However, we believe that this increased consumption has nothing to do with inferred tastiness and increased attractiveness of the unhealthy organic food. In line with the observation that any reason may become a good reason to indulge when the indulgence is tempting (van de Ven, Blanken, & Zeelenberg, 2018), Schuldt and Schwarz (2010) point out that the organic label gives people an excuse to eat more of the tempting unhealthy food. Thus, in this case increased consumption is not a result of increased tastiness or attractiveness.

From a practical perspective, our results are relevant to a number of food producers and marketers by providing them with greater understanding of the impact of organic labels on consumer product evaluations. Several surveys have shown that taste is one of the primary reasons for purchasing organic food products (for a review see Hughner et al., 2007). Therefore, our findings extend current knowledge and provide practitioners with insight for which product categories an organic label may be effective to positively influence consumer evaluations. This may be particularly important in a case of new organic product or brand introductions and communication strategy development to prevent consumers' biased judgment.

Summarized, our findings indicate that health associations of organic labels may lead to other erroneous consumer conclusions. Our study shows the value of studying the interrelations of different associations with organic foods. Rather than focusing on health or taste in isolation, it should be recognized that these perceptions interact and influence each other. Future research could investigate how to overcome these misinterpretations of organic labels.

CRediT authorship contribution statement

Kristina Nadricka: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Visualization, Writing - review & editing. **Kobe Millet:** Conceptualization, Methodology, Validation, Writing - original draft, Writing - review & editing, Supervision. **Peeter W.J. Verlegh:** Conceptualization, Validation, Writing - review & editing, Supervision.

Declaration of Competing Interest


The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Evaluation task example for a neutral product (white rice) in Study 1

How tasty would white rice appear to you in the local grocery store?

	Very untasty	Untasty	Neutral	Tasty	Very tasty
 <p>White rice</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How tasty would organic white rice appear to you in the organic grocery store?

	Very untasty	Untasty	Neutral	Tasty	Very tasty
  <p>Organic White Rice</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix B. Mean scores of healthiness and familiarity of 34 various food products in pretest

Category	Food Product	Healthy	Familiar	Chosen for a Study
Healthy	Apple	4.60	4.80	Study 2 and 3, healthy product
Healthy	Fresh Carrot Juice	4.58	3.35	
Healthy	Tomatoes	4.57	4.67	
Healthy	Strawberries	4.51	4.64	Study 2 and 3, healthy product
Healthy	Grapes	4.51	4.52	
Healthy	Squash	4.48	3.78	
Healthy	Avocado	4.41	4.28	Study 2 and 3, healthy product
Healthy	Green Tea	4.38	3.97	
Healthy	Almonds	4.29	4.42	
Healthy	Oatmeal	4.22	4.37	Study 2 and 3, healthy product
Healthy	Brown Rice	4.18	4.40	
Healthy	Fresh Orange Juice	4.10	4.57	
Healthy	Cashews	4.06	4.42	Study 2 and 3, healthy product
Healthy	Raisins	4.06	4.44	
Healthy	Wholegrain Bread	4.04	4.40	
Healthy	Eggs	4.02	4.77	Study 2 and 3, healthy product
Healthy	Tomato Soup	3.89	4.19	
Healthy	Granola	3.84	4.21	
Healthy	Granola Bars	3.50	4.30	Study 2 and 3, healthy product
Neutral	Coffee	3.31	4.59	
Neutral	White Rice	3.14	4.67	
Unhealthy	Oatmeal Cookies	2.56	4.45	Study 1, neutral product
Unhealthy	Salted Crackers	2.52	4.42	
Unhealthy	White Bread	2.44	4.68	

Unhealthy	Pumpkin Pie	2.16	4.26	
Unhealthy	Apple Pie	2.00	4.52	
Unhealthy	French Fries	1.74	4.82	
Unhealthy	Potato Chips	1.70	4.77	Study 2 and 3, unhealthy product
Unhealthy	Ice Cream	1.67	4.76	Study 2 and 3, unhealthy product
Unhealthy	Chocolate Truffles	1.63	3.85	
Unhealthy	Chocolate Cookies	1.54	4.58	Study 2 and 3, unhealthy product
Unhealthy	Sugary Cereal	1.49	4.42	Study 2 and 3, unhealthy product
Unhealthy	Jelly Beans	1.35	4.27	
Unhealthy	Sugar Candies	1.32	4.32	Study 2 and 3, unhealthy product

Appendix C. Description of control measures

Health Consciousness (Michaelidou & Hassan, 2008) (Study 1: $\alpha = 0.85$; Study 2: $\alpha = 0.82$; Study 3: $\alpha = 0.86$) (1 = strongly disagree, 5 = strongly agree)

- I reflect about my health a lot
- I'm very self-conscious about my health
- I'm alert to changes in my health
- I'm usually aware of my health
- I take responsibility for the state of my health
- I'm aware of the state of my health as I go through the day

Subjective knowledge on organic products (adapted from Pieniak, Aertsens & Verbeke, 2010) (Study 1: $\alpha = 0.90$; Study 2: $\alpha = 0.87$; Study 3: $\alpha = 0.92$) (1 = strongly disagree, 5 = strongly agree)



- Compared with an average person I know a lot about organic food products
- I know a lot about how to evaluate the quality of organic food products.
- People who know me, consider me as an expert in the field of organic food products

Environmental concern (NEP; Dunlap et al., 2000) (Study 3: $\alpha = 0.91$) (1 = strongly disagree, 5 = strongly agree)





- We are approaching the limit of the number of people the earth can support
- Humans have the right to modify the natural environment to suit their needs
- When humans interfere with nature it often produces disastrous consequences
- Human ingenuity will insure that we do not make the earth unlivable
- Humans are severely abusing the environment
- The earth has plenty of natural resources if we just learn how to develop them
- Plants and animals have as much right as humans to exist
- The balance of nature is strong enough to cope with the impacts of modern industrial nations
- Despite our special abilities humans are still subject to the laws of nature
- The so-called "ecological crisis" facing humankind has been greatly exaggerated
- The earth is like a spaceship with very limited room and resources
- Humans were meant to rule over the rest of nature
- The balance of nature is very delicate and easily upset
- Humans will eventually learn enough about how nature works to be able to control it
- If things continue on their present course, we will soon experience a major ecological catastrophe

Appendix D. Evaluation task example for 5 healthy and 5 unhealthy food products (shown in randomized order) in Study 2

Imagine that you are **going to the local grocery store** to make use of your gift certificate.
How tasty do you think **the following food items** would appear to you in the store?

	Very untasty	Untasty	Neutral	Tasty	Very tasty
 Apple	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Ice Cream	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Imagine that you are **going to the organic food store** to make use of your gift certificate.
How tasty do you think **the following food items** would appear to you in the store?

	Very tasty	Untasty	Neutral	Tasty	Very tasty
  Organic Apple	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
  Organic Ice Cream	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix E. Mean scores of perceived taste for healthy and unhealthy food products in Study 2

Food Product	Non-Organic M (SD)	Organic M (SD)	P value
Healthy Category	3.74 (0.53)	3.96 (0.63)	0.015
Almonds	2.99 (1.14)	3.43 (1.00)	0.008
Apple	3.59 (0.86)	3.97 (0.87)	0.004
Bread	3.49 (0.87)	3.72 (1.04)	0.117
Fresh Orange Juice	4.37 (0.72)	4.33 (0.79)	0.763
Strawberries	4.26 (0.83)	4.33 (0.76)	0.567
Unhealthy Category	3.32 (0.62)	3.28 (0.70)	0.646
Candy	3.08 (1.03)	2.87 (1.03)	0.186
Chips	3.83 (0.78)	3.63 (0.97)	0.144
Chocolate Cookies	3.76 (0.92)	3.70 (0.95)	0.685
Ice Cream	3.59 (1.01)	3.61 (0.91)	0.874
Sugary Cereal	2.37 (1.10)	2.57 (1.10)	0.214

Appendix F. Mean scores of attractiveness for healthy and unhealthy food products in Study 3

Food Product	Non-Organic M (SD)	Organic M (SD)	P value
Healthy Category	3.71 (0.62)	3.89 (0.76)	0.046
Almonds	3.37 (1.31)	3.69 (1.81)	0.050
Apple	3.77 (0.90)	4.05 (1.00)	0.023
Bread	3.41 (1.20)	3.63 (1.12)	0.152
Fresh Orange Juice	3.83 (1.08)	3.88 (1.03)	0.727
Strawberries	4.19 (0.82)	4.22 (0.98)	0.781
Unhealthy Category	3.08 (0.85)	2.96 (0.83)	0.26
Candy	2.34 (1.34)	2.28 (1.15)	0.709
Chips	3.30 (1.23)	3.09 (0.17)	0.173
Chocolate Cookies	3.36 (1.23)	3.45 (1.20)	0.568
Ice Cream	3.77 (1.18)	3.66 (1.06)	0.468
Sugary Cereal	2.63 (1.31)	2.30 (1.17)	0.043

Appendix G. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.foodqual.2020.103896>.

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